

CLAIMS

What is claimed is:

1. An electrokinetic method for groundwater protection, soil remediation and/or soil engineering which comprises applying an electric field between iron-rich sacrificial electrodes, which are implanted in an area of water-bearing soil, sediment or slurry so as to generate a an abrupt pH and Eh gradient from acid to alkaline conditions, with the spontaneous *in situ* precipitation of a stable iron-rich band occurring at the boundary between the acid and alkaline zones.
2. A method as claimed in claim1, wherein the pH gradient is from pH2 to pH13.
3. A method as claimed in claim 1, wherein the current is applied between one or more pairs of electrodes inserted in the area of soil, sediment or slurry.
4. A method as claimed in claim 3, wherein the electrodes are made of cast iron, scrap iron, stainless steel or other iron-rich material.
5. A method as claimed in claim 3, wherein the voltage employed is less than 0.5 volts per cm of the distance between a pair of electrodes.

6. A method as claimed in claim 1, wherein the soil, sediment or slurry contains organic, inorganic and/or radioactive contaminants.

7. A method as claimed in claim 1, wherein the iron-rich band acts as a physical and/or chemical barrier to contaminants present in the soil, sediment or slurry.

8. A method claim 1, where iron is precipitated to form an impermeable coherent band, or a coating which cements soil/sediment particles, or a dispersed coating on mineral grains, between two or more electrodes.

9. A method as claimed in claim 1, wherein the generation of the pH/Eh gradient mobilises, remobilises and/or traps contaminants present in the soil, sediment or slurry.

10. A method as claimed claim 1, which is performed for the purpose of the stabilisation and/or strategic dewatering/rewatering of soils, sediment and/or slurries, the improvement of the physical properties of soils and sediments for engineering purposes, the forced and directed migration of contaminated leachates, and/or electro-osmotic purging of non-polar contaminants.

11. A method as claimed in claim 2, wherein the current is applied between one or more pairs of electrodes inserted in the area of soil, sediment or slurry.

12. A method as claimed in claim 4, wherein the voltage employed is less than 0.5 volts per cm of the distance between a pair of electrodes.

13. A method as claimed in claim 2, wherein the soil, sediment or slurry contains organic, inorganic and/or radioactive contaminants.

14. A method as claimed in claim 3, wherein the soil, sediment or slurry contains organic, inorganic and/or radioactive contaminants.

15. A method as claimed in claim 4, wherein the soil, sediment or slurry contains organic, inorganic and/or radioactive contaminants.

16. A method as claimed claim 2, which is performed for the purpose of the stabilisation and/or strategic dewatering/rewatering of soils, sediment and/or slurries, the improvement of the physical properties of soils and sediments for engineering purposes, the forced and directed migration of contaminated leachates, and/or electro-osmotic purging of non-polar contaminants.

17. A method as claimed claim 3, which is performed for the purpose of the stabilisation and/or strategic dewatering/rewatering of soils, sediment and/or slurries, the improvement of the physical properties of soils and sediments for engineering purposes, the forced and directed migration of contaminated leachates, and/or electro-osmotic purging of non-polar contaminants.

18. A method as claimed claim 4, which is performed for the purpose of the stabilisation and/or strategic dewatering/rewatering of soils, sediment and/or slurries, the improvement of the physical properties of soils and sediments for engineering purposes, the forced and directed migration of contaminated leachates, and/or electro-osmotic purging of non-polar contaminants.

19. A method as claimed claim 5, which is performed for the purpose of the stabilisation and/or strategic dewatering/rewatering of soils, sediment and/or slurries, the improvement of the physical properties of soils and sediments for engineering purposes, the forced and directed migration of contaminated leachates, and/or electro-osmotic purging of non-polar contaminants.

20. A method as claimed claim 6, which is performed for the purpose of the stabilisation and/or strategic dewatering/rewatering of soils, sediment and/or slurries, the improvement of the physical properties of soils and sediments for engineering purposes, the forced and directed migration of contaminated leachates, and/or electro-osmotic purging of non-polar contaminants.